

AD-A031 688

ARMY AVIATION TEST BOARD FORT RUCKER ALA
MILITARY POTENTIAL TEST OF PRIMARY HELICOPTER TRAINERS.(U)
JUN 67

F/G 1/3

UNCLASSIFIED

NL

| OF |
AD
A031 688



END

DATE
FILMED
12-76

ADA031688

~~FOR OFFICIAL USE ONLY~~

DEPARTMENT OF THE ARMY
UNITED STATES ARMY AVIATION TEST BOARD
Fort Rucker, Alabama 36360

1
NW

12 14p

STEBG-TD

9

6

11 22 JUN 22 1967

SUBJECT: Final Report of Test, Military Potential Test of Primary Helicopter Trainers, RDT&E Project No. USATECOM Project No. 4-7-1000-01

TO: See Distribution

DDC
RECEIVED
NOV 8 1976
AOK

1. References.

a. Letter, AMSAV-O, Headquarters, US Army Aviation Materiel Command, 13 December 1966, subject: "Flight Testing, Primary and Instrument Helicopter Trainers."

b. Letter, AMSTE-BG, Headquarters, US Army Test and Evaluation Command, 3 January 1967, subject: "Test Directive, Military Potential Test, Primary and Instrument Helicopter Trainers."

c. Message, AMSAV-O-O 02-19007, Commanding General, US Army Aviation Materiel Command, 21 February 1967, subject: "Confirmation of Guidance from USAAVCOM."

d. Letter, AMSAV-PAIRO, Headquarters, US Army Aviation Materiel Command, 24 February 1967, subject: "re: IFB No. DAAJ01-67-B-0328(O) (Step One)," with four inclosures: Annex A, "General

*"MANUFACTURER'S CODE SHEET (INCLOSURE
*1) AND OTHER DOCUMENTS ATTACHED AS
*INCLOSURE 3 WILL BE REMOVED BEFORE
*THIS DOCUMENT IS DISTRIBUTED OUTSIDE
*THE DEPARTMENT OF DEFENSE."

Approved for public release;
distribution unlimited

036500

~~FOR OFFICIAL USE ONLY~~

Encl 98

Jones
2ND IAD, USAARCOM
12 Jul 67

~~FOR OFFICIAL USE ONLY~~

STEBG-TD

SUBJECT: Final Report of Test, "Military Potential Test of Primary Helicopter Trainers," RDT&E Project No. _____, USATECOM Project No. 4-7-1000-01

Specification for Helicopter, Primary Trainer;" Annex B, "Plan of Test, Helicopter, Primary Trainer;" Annex C, "Required Content of Technical Proposals;" and Annex D, "Format of Proposed IFB (Step Two)."

e. Plan of Test, USATECOM Project No. 4-7-1000-01, "Evaluation of Commercial 'Off-the-Shelf' Helicopters as Primary Helicopter Trainers," US Army Aviation Test Board, undated.

2. Background.

a. On 3 January 1967, the US Army Test and Evaluation Command directed the US Army Aviation Test Board (USAAVNTBD) to conduct a military potential test of commercial off-the-shelf primary helicopter trainers to assist the US Army Aviation Materiel Command (~~USAAVCOM~~) during evaluation of the first-step proposals (~~reference 1b~~). Test Helicopter C was received for test on 19 April 1967 and testing began on 19 April 1967. Flight and ground tests were completed on 28 April 1967. Total flight time was 15.0 hours including mission suitability tests conducted by the US Army Primary Helicopter School, which will be reported through the US Continental Army Command channels.

b. Personnel of the US Army Board for Aviation Accident Research (USABAAR) conducted a safety evaluation of the helicopter.

3. Description of Materiel.

a. Helicopter C has a two-bladed, semirigid main rotor and a two-bladed antitorque rotor. The helicopter is powered by a 260 shaft horsepower, Lycoming VO-435-B1A, six-cylinder reciprocating engine. The two-place helicopter has side-by-side seats and dual flight controls. The cabin area is inclosed in a bubble-type tinted plastic canopy. The helicopter has skid-type landing gear. The main fuselage and tail boom are of truss-type construction with all drive components visible. The engine drives the rotor system through a self-engaging centrifugal clutch which transfers power to the two-stage planetary gear system in the transmission. A sprag-type overrunning clutch disengages the rotor → P 3

~~FOR OFFICIAL USE ONLY~~

~~FOR OFFICIAL USE ONLY~~

STEBCG-TD

col
SUBJECT: Final Report of Test, "Military Potential Test of Primary Helicopter Trainers," RDT&E Project No. _____, USA TECOM Project No. 4-7-1000-01

for autorotation. The engine is vertically mounted within the truss frame of the fuselage.

b. The weights and dimensions of Helicopter C are:

- | | |
|---|-------------------------|
| (1) Empty weight | 1,682 pounds |
| (2) Fuel capacity (100/130 AVGAS) | 57 gallons (342 pounds) |
| (3) Oil capacity (SAE 40) | 9 quarts (18 pounds) |
| (4) Mission gross weight | 2,452 pounds |
| (5) Maximum certified gross weight | 2,850 pounds |
| (6) Rotor diameter | 37 feet, 1 1/2 inches |
| (7) Maximum length of helicopter with main-rotor blade forward | 43 feet, 2 1/2 inches |
| (8) Width of cabin interior | 4 feet, 7 1/2 inches |
| (9) Height of main rotor above ground, minimum, fuselage level (non-rotating) | |
| Droop stops out | 6 feet, 2 1/2 inches |
| Droop stops in | 7 feet, 2 inches |
| (10) Height of main rotor above ground, mission gross weight, flat pitch, 322 rotor r.p.m., cyclic centered | 8 feet, 6 1/4 inches |
| (11) Maximum height, ground to top of mast | 9 feet, 6 3/8 inches |

~~FOR OFFICIAL USE ONLY~~

Life Section	<input checked="" type="checkbox"/>
11 Section	<input type="checkbox"/>
AVAILABILITY CODES	
AVAIL. CODE SPECIAL	

A

~~FOR OFFICIAL USE ONLY~~

STEBG-TD

SUBJECT: Final Report of Test, "Military Potential Test of Primary Helicopter Trainers," RDT&E Project No. _____, USATECOM Project No. 4-7-1000-01

4. Objective.

To determine whether the test helicopter meets those requirements in paragraph 3 of the General Specification which are determined to be testable.

5. Test Criteria. Annex A of reference 1d was the test criteria for this evaluation.

6. Summary of Results. Subparagraphs and appendices contained in paragraph 3 of the General Specification (reference 1d) which were determined to be testable and were investigated are listed in inclosure 1.

a. The test helicopter met the requirements in the following subparagraphs of the General Specifications:

3.1.2.2.a	3.5.1.8	3.13.1.5
3.1.2.2.b	3.6.1.7	3.13.1.6
3.1.3	3.8.1	3.13.1.9
3.1.4	3.8.3	3.13.1.12
3.1.6	3.10.3	3.13.1.13
3.2.1	3.10.4	3.20.a
3.2.4	3.12.8	3.20.b
3.2.10	3.12.15.4	3.20.c
3.2.12	3.12.15.5	3.20.d
3.4.6	3.12.15.6	3.21
3.5.1.2	3.13.1.3	3.24.a
3.5.1.6	3.13.1.4	3.24.c

b. The following configuration requirements (other than avionic equipment) were not met:

<u>General Specification Paragraph Number</u>	<u>Description</u>	<u>Remarks</u>
3.5.1.5	Blade-folding provisions.	Not provided.

~~FOR OFFICIAL USE ONLY~~

~~FOR OFFICIAL USE ONLY~~

STEBG-TD

SUBJECT: Final Report of Test, "Military Potential Test of Primary Helicopter Trainers," RDT&E Project No. _____, USATECOM Project No. 4-7-1000-01

General Specification
Paragraph Number

Description

Remarks

3.7.1.3	Internal and external emergency release for crew compartment doors.	Not provided.
3.7.1.3	Data case.	Not provided.
3.7.1.3	All switches necessary for flight accessible to both pilots.	Landing light switch and starter button accessible to left pilot only. (See 3.12.12 and 3.13.1.14.)
3.7.1.3	Generally conform to MIL-STD 250B:	
	(a) Landing checklist.	Not provided.
	(b) Single controls to adjust both pedals.	Not provided.
3.10.1	Hydraulic boost function with main propulsion unit inoperative.	Not provided; boost operates from engine.
3.12.12	Starting may be accomplished from either crew station.	Starter button located only on left collective pitch control.
3.12.15	Main-rotor transmission chip detector and warning light.	Not provided.

~~FOR OFFICIAL USE ONLY~~

~~FOR OFFICIAL USE ONLY~~

STEBG-TD

SUBJECT: Final Report of Test, "Military Potential Test of Primary
Helicopter Trainers," RDT&E Project No. _____,
USATECOM Project No. 4-7-1000-01

<u>General Specification Paragraph Number</u>	<u>Description</u>	<u>Remarks</u>
3.13.1.1	28-volt electrical system.	A 12-volt power system was provided.
3.13.1.1.1	Battery quick-disconnect connector per MS25182.	Not provided.
3.13.1.2	A 28-volt d.c. power source.	An alternator was provided for the 12-volt system.
3.13.1.7	External power receptacle.	Not provided.
3.13.1.10	Two dimming controls shall be provided for external and internally lighted instruments.	A single dimming control was provided for all instruments.
3.13.1.11	Amber warning lights or annunciator panel.	Not provided.
3.13.1.14	Landing light switch located on both pilots' cyclic controls.	Switch was installed only on left collective pitch control. (MIL-STD 250B requires landing light switch on collective pitch control.)

~~FOR OFFICIAL USE ONLY~~

~~FOR OFFICIAL USE ONLY~~

STEBG-TD

SUBJECT: Final Report of Test, "Military Potential Test of Primary Helicopter Trainers," RDT&E Project No. _____, USATECOM Project No. 4-7-1000-01

General Specification
Paragraph Number

Description

Remarks

3.15	Mission and air traffic control system.	Not provided in accordance with SCS-304.
3.24.b	Heating system.	Not provided; available as a kit.
3.24.d	Defrosting and defogging provisions.	Not provided.
3.26.1	Fire extinguisher.	Not provided.
3.26.2	First-aid kit.	Not provided.

c. None of the avionic equipment listed in the following criteria appendices was provided:

Appendix I-A, Sections I and II

Appendix I-C, Section II

d. Ambient weather conditions during the test period did not reach those specified in the performance requirements of paragraph 3.1.2.2; therefore, the required performance characteristics could not be determined at the specified conditions. Flights were conducted at prevailing weather conditions and the following were determined:

Paragraph

Condition

Results

3.1.2.2.c	Endurance, at 65 knots, 1,000 feet pressure altitude, outside air temperature (OAT) 25°C., mission gross weight, no fuel conservation.	4.5 hours (Fuel consumed was 30.4 gallons for 2.5 hours.)
-----------	--	--

~~FOR OFFICIAL USE ONLY~~

~~FOR OFFICIAL USE ONLY~~

STEBG-TD

SUBJECT: Final Report of Test, "Military Potential Test of Primary Helicopter Trainers," RDT&E Project No. _____, USATECOM Project No. 4-7-1000-01

<u>Paragraph</u>	<u>Condition</u>	<u>Results</u>
3.1.2.2.d	Hover out of ground effect, mission gross weight, OAT 15°C.	5,500 feet pressure altitude.
3.1.2.2.f	Rate of climb, takeoff rated power, 300 ft. pressure altitude to 1,450 ft. pressure altitude, OAT 24°C., mission gross weight.	1,150 feet/minute
	Rate of climb, normal rated power, 900 ft. pressure altitude to 1,630 feet pressure altitude, OAT 24°C., mission gross weight.	930 feet/minute
3.1.2.2.1	Autorotational speed at 355 rotor r.p.m., 1,000 ft. pressure altitude, OAT 24°C.	45 knots true airspeed.
3.1.2.2.m	Rate of descent, autorotation, 355 rotor r.p.m., 45 knots true airspeed, 1,000 ft. pressure altitude, OAT 24°C.	1,760 feet/minute.
3.1.2.2.n	Maximum altitude required to regain autorotation r.p.m. from 322 r.p.m. to 355 r.p.m., 1,000 ft. pressure altitude, OAT 24°C.	180 feet.

e. Inclosure 2 is USABAAR's safety evaluation report.

f. Inclosure 3 contains required minimum information to be provided with the test helicopter in accordance with Annex A, reference 1d.

~~FOR OFFICIAL USE ONLY~~

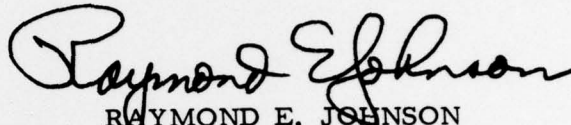
~~FOR OFFICIAL USE ONLY~~

STEBG- TD

SUBJECT: Final Report of Test, "Military Potential Test of Primary
Helicopter Trainers," RDT&E Project No. _____,
USATECOM Project No. 4-7-1000-01

7. Conclusion. None.

8. Recommendation. None.



RAYMOND E. JOHNSON
Colonel, Artillery
President

4 Incls

1. Test Data
2. USABAAR Report
3. Supplemental Information
4. Manufacturer's Code Sheet

DISTRIBUTION:

Commanding General 5 cys
US Army Aviation Materiel Command
ATTN: AMSAV-O (Mr. Hendrickson)
P.O. Box 209, Main Office
St. Louis, Missouri 63166

Commanding General 5 cys
US Army Materiel Command
ATTN: AMCFI (Mr. Riesynder)
Washington, D.C. 20315

Commanding General 2 cys
US Army Test and Evaluation Command
ATTN: AMSTE-BG
Aberdeen Proving Ground, Maryland 21005

Commanding General 5 cys
US Continental Army Command
ATTN: DCIT-SCH-PD
Fort Monroe, Virginia 23351

~~FOR OFFICIAL USE ONLY~~

~~FOR OFFICIAL USE ONLY~~

The following subparagraphs and appendices contained in paragraph 3 of the General Specifications were determined to be testable and were investigated:

3.1.2.2.a	3.7.1.3	3.13.1.10
3.1.2.2.b	3.8.1	3.13.1.11
3.1.2.2.c	3.8.3	3.13.1.12
3.1.2.2.d	3.10.1	3.13.1.13
3.1.2.2.f	3.10.3	3.13.1.14
3.1.2.2.1	3.10.4	3.15
3.1.2.2.m	3.12.8	3.20.a
3.1.2.2.n	3.12.12	3.20.b
3.1.3	3.12.15	3.20.c
3.1.4	3.12.15.4	3.20.d
3.1.6	3.12.15.5	3.21
3.2.1	3.12.15.6	3.24.a
3.2.4	3.13.1.1	3.24.b
3.2.10	3.13.1.1.1	3.24.c
3.2.12	3.13.1.2	3.24.d
3.4.6	3.13.1.3	3.26.1
3.5.1.2	3.13.1.4	3.26.2
3.5.1.5	3.13.1.5	Appendix I-A,
3.5.1.6	3.13.1.6	Sections I and II
3.5.1.8	3.13.1.7	Appendix I-C,
3.6.1.7	3.13.1.9	Section II

INCLOSURE 1

~~FOR OFFICIAL USE ONLY~~

~~FOR OFFICIAL USE ONLY~~

USABAAR SAFETY EVALUATION

INCLOSURE 2

2-1

~~FOR OFFICIAL USE ONLY~~



~~OFFICIAL USE ONLY~~
DEPARTMENT OF THE ARMY
UNITED STATES ARMY BOARD FOR AVIATION ACCIDENT RESEARCH
FORT RUCKER, ALABAMA
36360

BAAR-E

1 MAY 1967

SUBJECT: Evaluation of Basic Helicopter Trainer - Test Helicopter C

TO: President
US Army Aviation Test Board
ATTN: Basic Helicopter Trainer
Project Officer
Fort Rucker, Alabama 36360

1. USABAAR conducted a safety evaluation of Helicopter C on 20 April and the following safety deficiencies were noted:

- a. No emergency releases were provided for the cockpit doors.
- b. No chip detector lights installed.
- c. No roll-over protection provided for cockpit area.
- d. Rigid fuel lines installed.
- e. No warning lights installed.
- f. Starter switch exposed and in close proximity to landing light switch on the pitch control.
- g. No heat or defrosting system installed.
- h. Seat belts installed jointly at a common center attachment. All seat belts attached rigidly in the lateral direction.

~~FOR OFFICIAL USE ONLY~~

BAAR-E

SUBJECT: Evaluation of Basic Helicopter Trainer - Test Helicopter C

i. Engine instruments are extremely small for rapid indication of unusual engine operation.

2. The following are considered outstanding safety features:

- a. Crash resistant fuel tanks.
- b. Accessibility for inspection and maintenance.
- c. Proven quality and reliability of similar helicopters.

Warren R. Williams, Jr.
WARREN R. WILLIAMS, JR.
Colonel, Infantry
Director

~~FOR OFFICIAL USE ONLY~~